3.6 Factoring Trinomials by Decomposition.

Example 1 Multiplying Two Binomials with Positive Terms

Expand: $(3d + 4)(4d + 2)$

SOLUTION

CHECK YOUR UNDERSTANDING

Factoring a Trinomial by Decomposition

Using example:
to multiply $(3h + 4)(2h + 1)$
$= 3h(2h + 1) + 4(2h + 1)$
$= 6h^2 + 3h + 8h + 4$
$= 6h^2 + 11h + 4$

To factor $6h^2 + 11h + 4$, using decomposition, we reverse the steps from above.

Notice that:
- the coefficients of the h-terms have the product: 3(8) = 24
- the product of the coefficient of the h^2-term and the constant term: 6(4) =24

So, to factor $6h^2 + 11h + 4$, we decompose the h-term and write it as a sum of two terms whose coefficients have a product of 24.

Factors of 24	Sum of Factors
1,24	25
2,12	14
3,8	11
4,6	10

The two factors that have a sum of 11 are 3 and 8.

We remove a common factor from the 1st pair of terms, and from the 2nd pair of terms:

$(6h^2 + 3h) + (8h + 4) = 3h(2h + 1) + 4(2h + 1)$

common to both

So, this equals: $(3h + 4)(2h + 1)$

Example 4 Factoring a Trinomial by Decomposition

Factor.

a) $3s^2 - 13s - 10$

Step One: multiply the first and last numbers $3(-10) = -30$

Step Two: Find all possible factors of -30

$-15, 2$ $-3, 10$ $1, -30$ $-5, 6$
$15, -2$ $3, -10$ $-1, 30$ $5, -6$

Step Three: Which pair adds to make -13?

$-15, 2$

Step Four: Replace -13 with the two factors

$3s^2 - 15s + 2s - 10$

Step Five: Factor the first two terms and then the last two

SOLUTION

$3s(s - 5) + 2(s - 5)$

$(s - 5)(3s + 2)$ ✓

CHECK YOUR UNDERSTANDING

5.6 Polynomials of the Form $ax^2 + bx + c$

b) $6x^2 - 21x + 9$

$6x^2 - 18x - 3x + 9$

$6x(x-3) - 3(x-3)$

$(x-3)(6x-3)$

$54 = 30 - 24 = 10 \times 18$

$-54, -1$

$-27, -2$

$-9, -6$

$\boxed{-18, -3}$

Practice Questions:

Pg. 178 #15 (Factor by decomposition)

Step One: multiply the first and last numbers

Step Two: Find all possible factors

Step Three: Which pair adds to make the middle term?

Step Four: Replace the middle term with the two factors

Step Five: Factor the first two terms and then the last two

Thursday, October 27

- Check and go over homework from yesterday (Pg.178 #15)
- Do practice questions
- Learn how to multiply larger polynomials
- Create a list of all multiplying and factoring examples

15. Factor. Check by expanding.

a) $5a^2 - 7a - 6$ **b)** $3y^2 - 13y - 10$

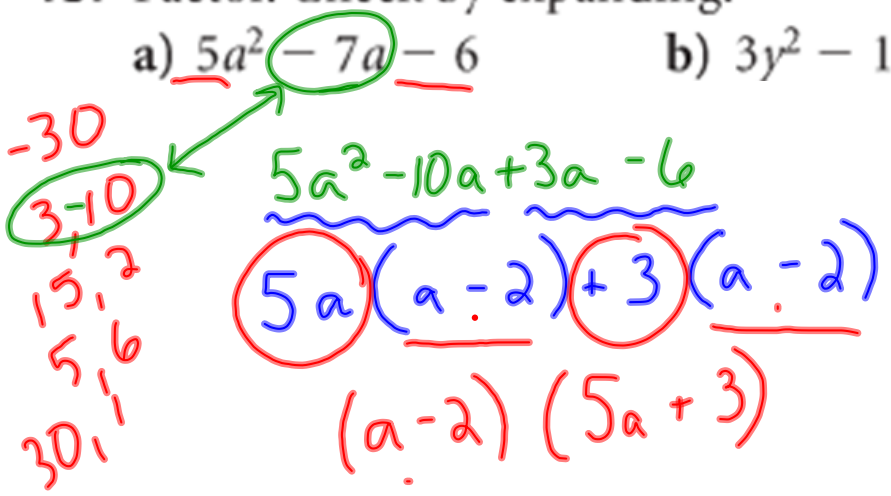
c) $5s^2 + 19s - 4$ **d)** $14c^2 - 19c - 3$

e) $8a^2 + 18a - 5$ **f)** $8r^2 - 14r + 3$

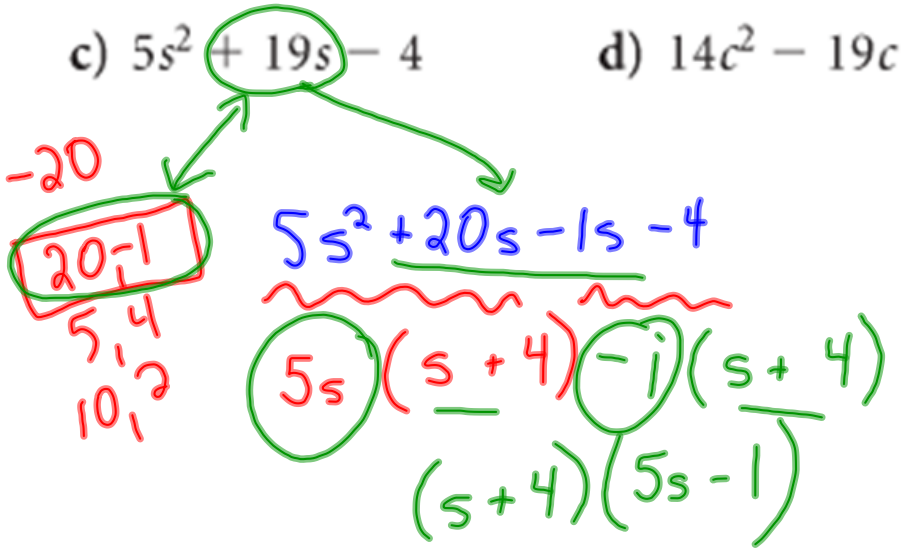
g) $6d^2 + d - 5$ **h)** $15e^2 - 7e - 2$

15. Factor. Check by expanding.

a) $5a^2 - 7a - 6$ **b)** $3y^2 - 13y - 10$



c) $5s^2 + 19s - 4$ **d)** $14c^2 - 19c - 3$



d) $14c^2 - 19c - 3$

$14c^2 - 21c + 2c - 3$

$7c(2c - 3) + 1(2c - 3)$

$(2c - 3)(7c + 1)$

$14(-3)$

-42

$6, 7$

$42, 1$

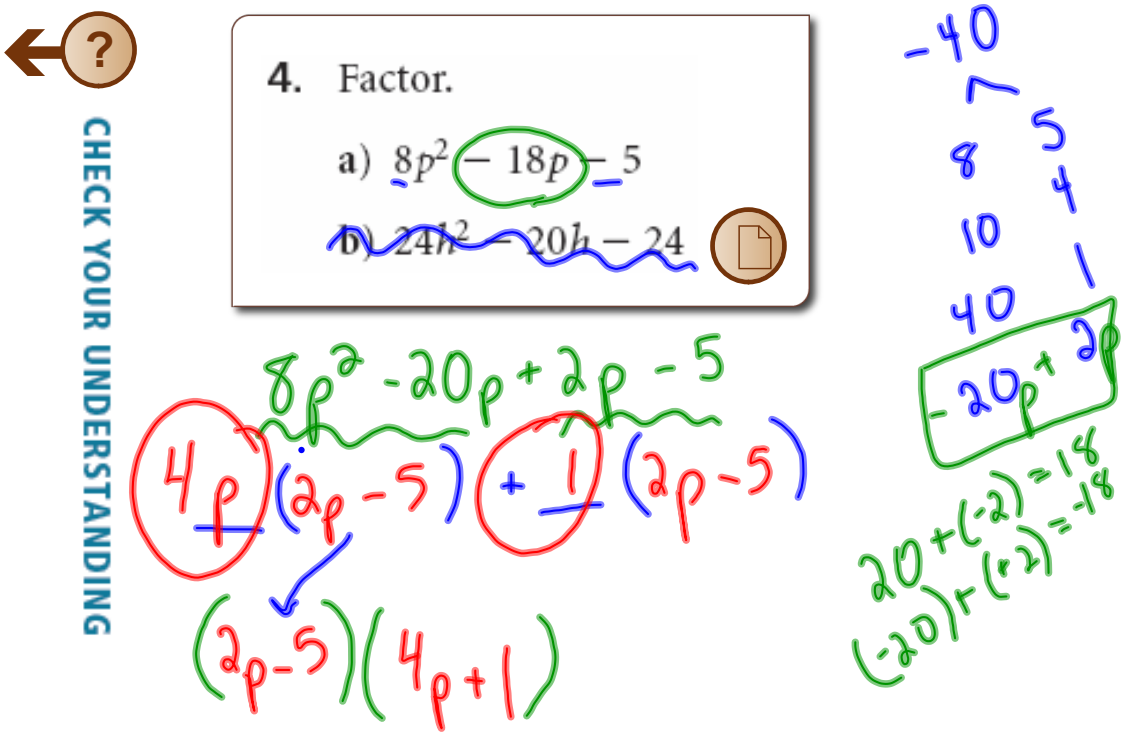
$-21, 2$

$3, 14$

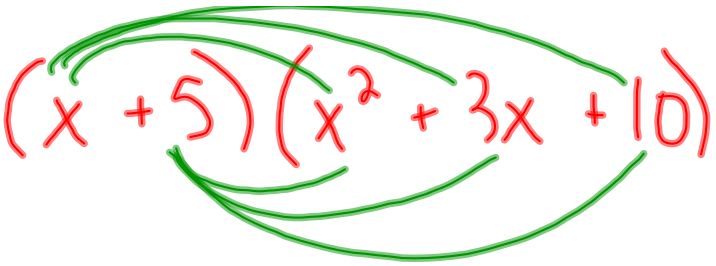
e) $8a^2 + 18a - 5$

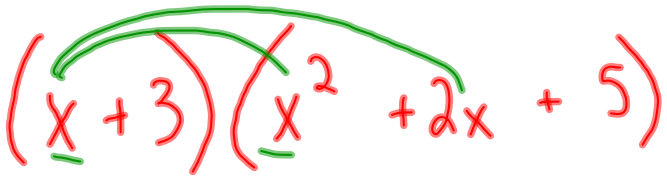
f) $8r^2 - 14r + 3$

g) $6d^2 + d - 5$ **h)** $15e^2 - 7e - 2$




(x + 5)(x + 2)


(x + 5)(x² + 3x + 10)



$x^3 + 2x^2 + 5x + 3x^2 + 6x + 15$

$x^3 + 5x^2 + 11x + 15$